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7/34

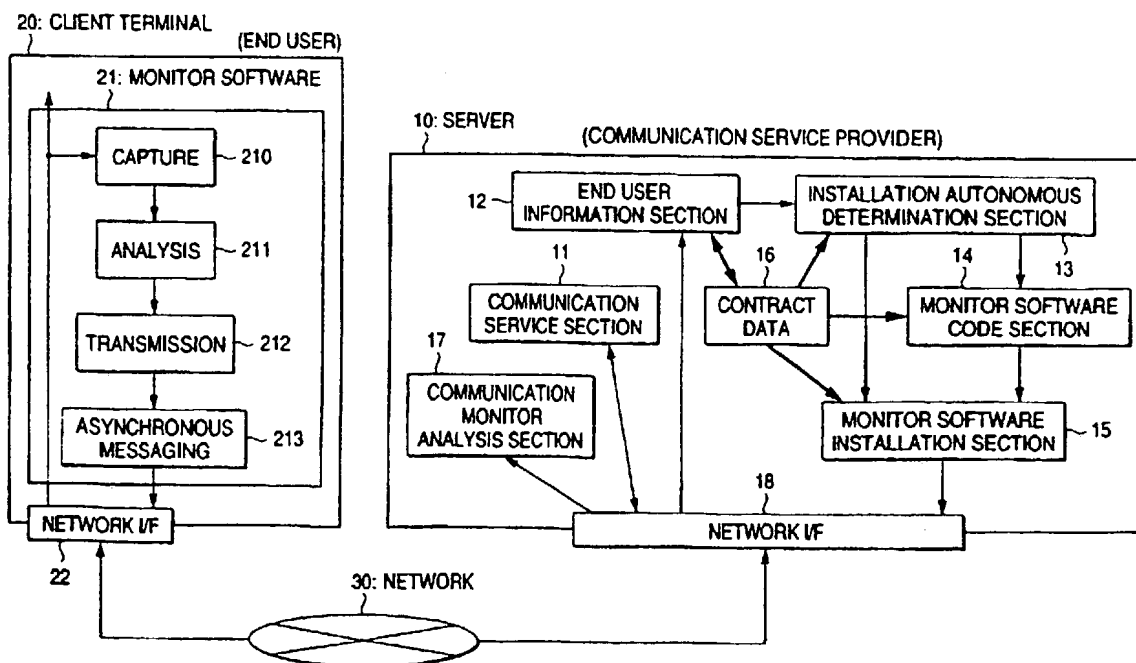
Online Databases: WPI, EPODOC, JAPIO

(54) Abstract Title

Installing network monitoring software in client terminals

(57) In a data communications network, network monitoring software is installed in client terminals 20 to gather and analyse communication data and transmit resultant data to a network server 10. The server stores the type of monitor software installed on the client terminals. When a client terminal changes its contract condition (or quits or restarts a contract for communication service) the server instructs the client to update, uninstall or install monitor software of a type appropriate to the new contract. The appropriate monitor software version is transmitted to the client and installed by means of a move agent. Thus storage of a large amount of unused monitor software in the client is not necessary.

FIG. 1



GB 2 341 774 A

FIG. 1

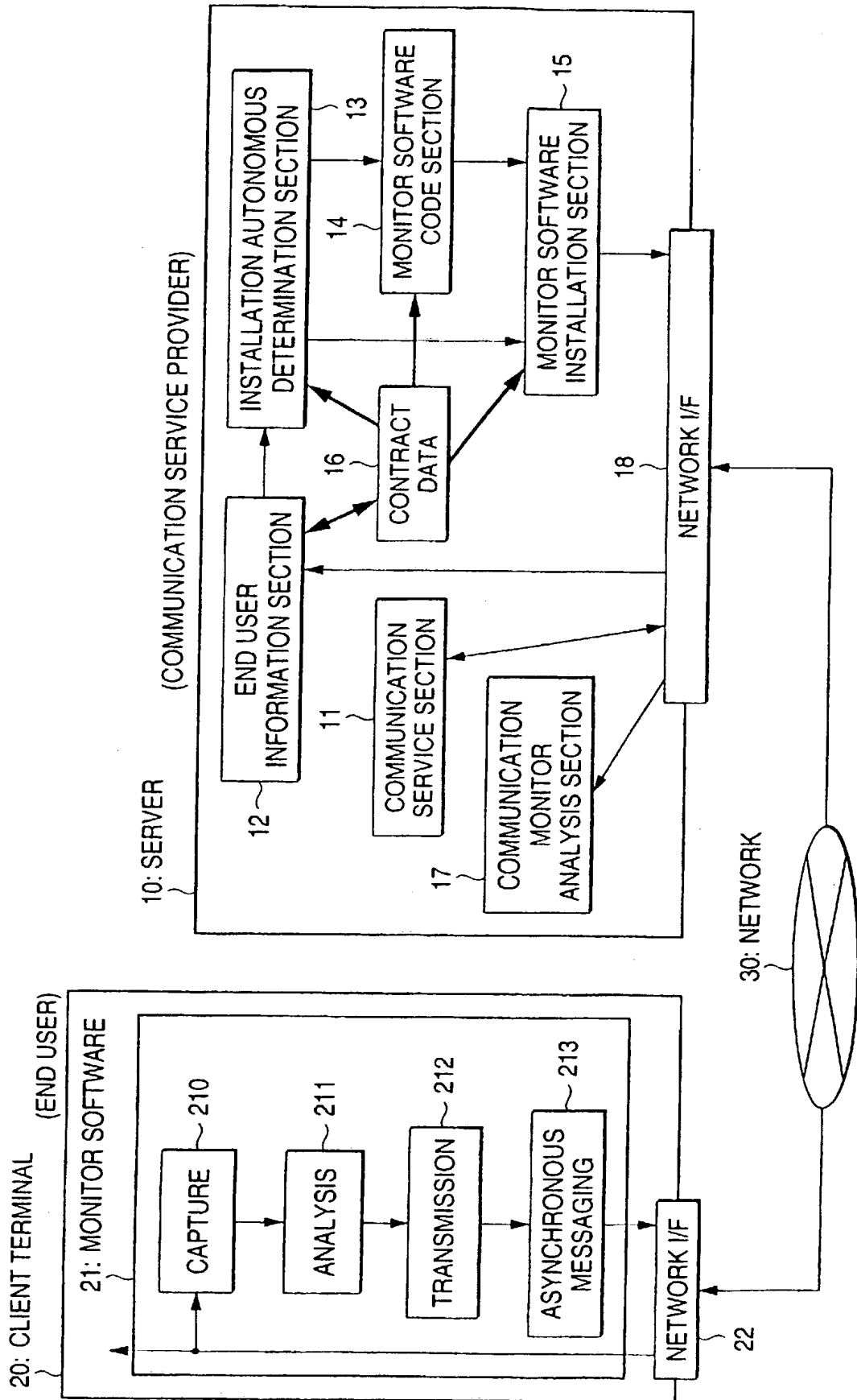


FIG. 2

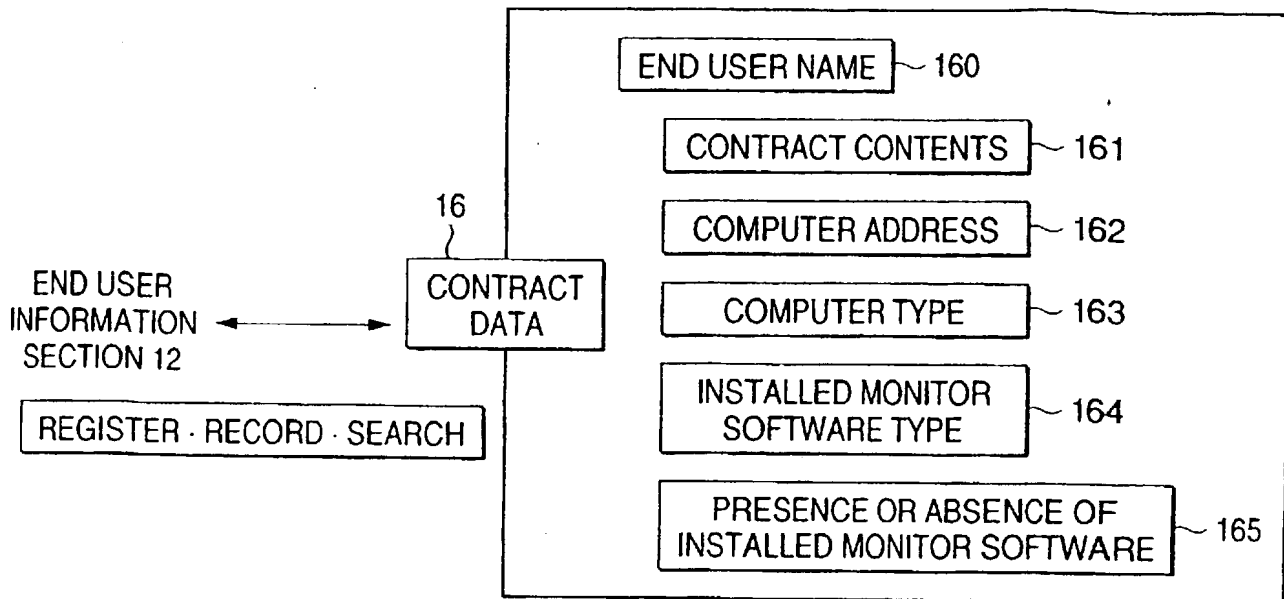


FIG. 3

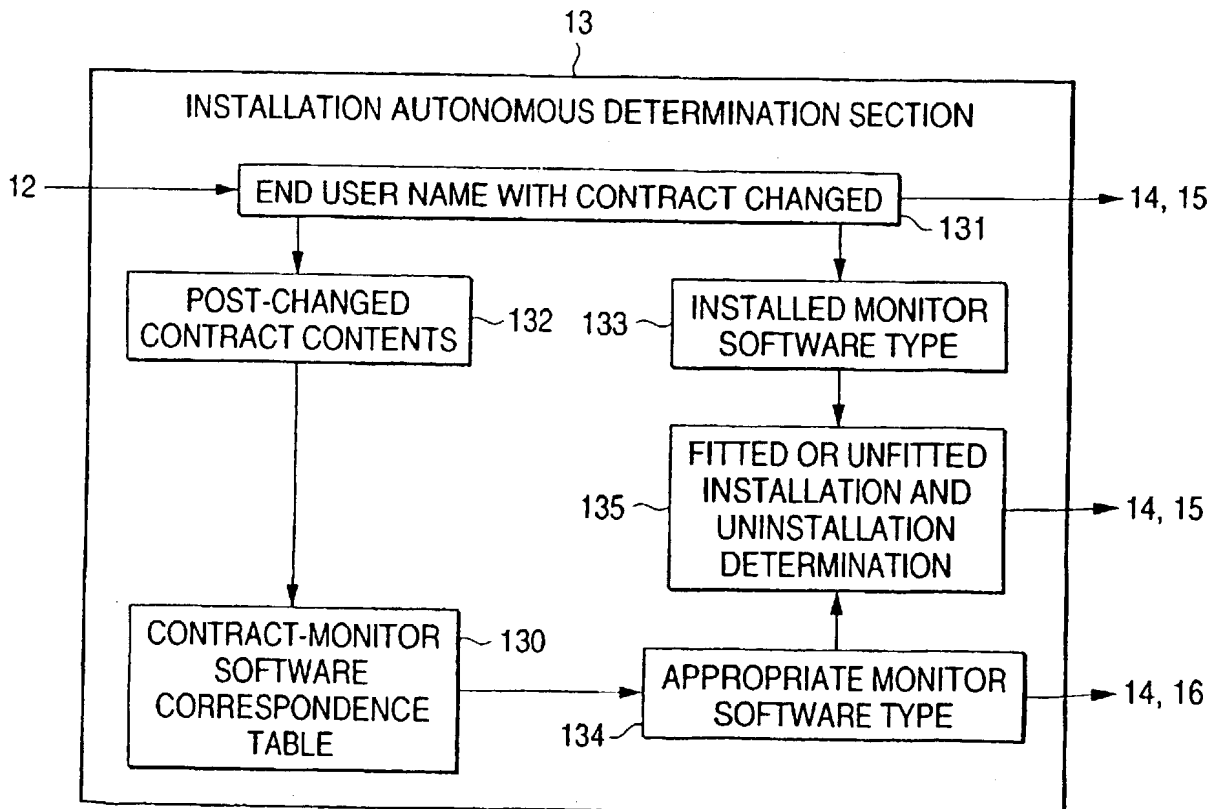


FIG. 4

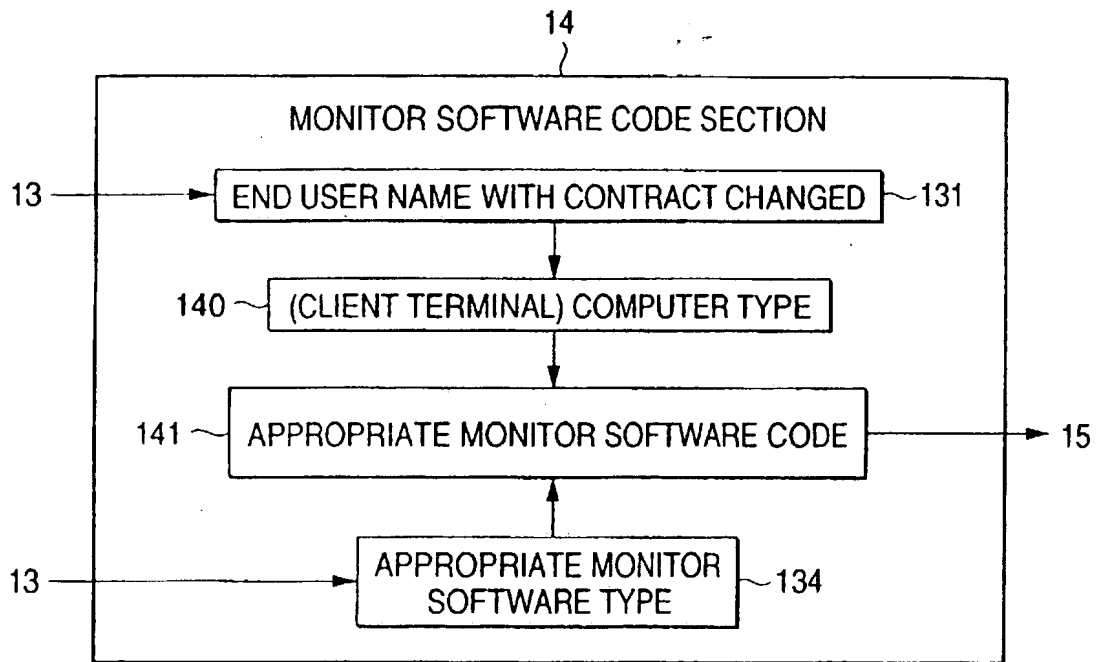
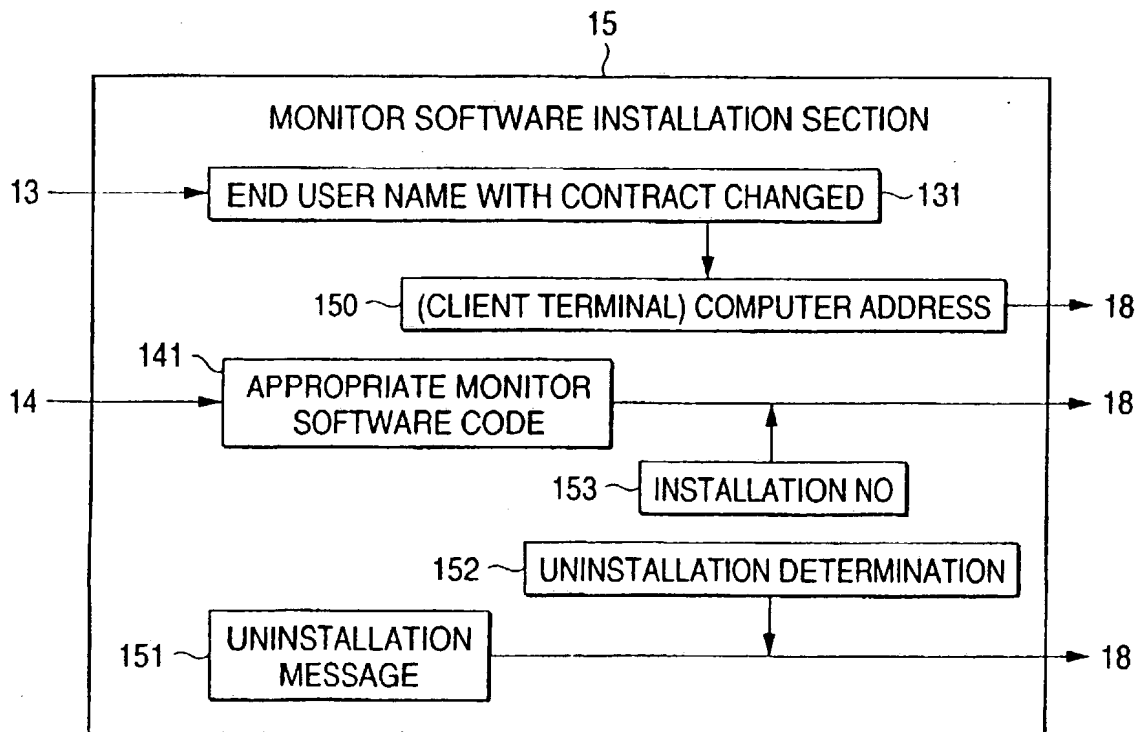


FIG. 5



## COMMUNICATION MONITOR SYSTEM

This invention relates to a communication monitor system for monitoring data communication executed between computers connected to a communication network and more particularly to a communication monitor system for managing monitor software executed in a client terminal placed at each end user in a server placed at a service provider in a unified way.

A communication monitor system is placed at one or more locations on a communication network for gathering and analyzing communication data passing through the communication network at the location. Since the communication monitor system can keep track of performance of the communication network such as the availability, traffic, and response time by executing such analysis, it can prevent a fault from occurring on the communication network and can also be used for planning, administration, etc., to optimize the scale and communication capacity of each of the units, systems, machines, etc., making up the communication network.

A management technique such as SNMP (Simple Network Management Protocol) or RMON (Remote network MONitoring) is often used with a communication monitor system installed in a local area

network (LAN). In such a technique, communication data is gathered at a terminal or a repeater such as a router, or a data gathering unit called a probe is placed at a proper location where a large amount of communication data passes through for gathering the communication data. The communication monitor system comprises not only a simple function of calculation processing of the data amount and traffic, but also complicated functions of calculation processing of traffic according to data type, transmission/reception address, time zone, etc., and processing of keeping track of the progress state of a specific protocol as the analysis function of the gathered data.

As the time zone where the communication monitor system operates the monitor function, for example, for traffic, the monitor function is always operated for gathering data or if a prediction that a fault may occur is made as use of a new specific protocol is started or if a purpose can be accomplished simply by making a sampling check, the monitor function is operated intermittently as required. In the above-described repeaters, terminals, and probes as the data gathering machines, software having an analysis function is installed in computers providing the machines or protocol analysis software for analyzing a specific protocol is installed.

On the other hand, if the analysis processing scale is large, to maintain the correct relationship between the computer throughput or performance and the processing scale, the data

gathering machine may perform simple analysis processing as required in addition to gathering of data and send the gathered data and the analysis result to an analysis unit placed at another location on the communication network, and complicated analysis processing may be performed in the analysis unit. To manage in a unified way a communication network where a large number of terminals and repeaters are placed, data from a large number of data gathering machines and analysis units may be sent to a central management system having large throughput or performance, and complicated analysis processing may be performed in batch in the central management system. In addition, Japanese Patent Application No. Hei 9-78486 filed by the present applicant or the like discloses a communication monitor system used in a configuration wherein a number of networks are connected to each other.

On the other hand, a form in which the client terminal placed at each end user and the server placed at the service provider make up the communication monitor system is also possible as described above. Here, assume the case where a new service using a protocol having a large processing scale is started on the communication network to be monitored. As a representative example of such a service, a moving picture communication service can be named. A server for transmitting moving pictures is placed in the service provider for providing the moving picture communication service and a client terminal for receiving and

displaying moving pictures is placed at each end user. The service provider keeps track of performance of moving picture communication and optimizes the quality of moving pictures for providing the end user with moving pictures of right quality; on the other hand, at the end user, the client terminal analyzes the moving picture protocol. In the moving picture communication service, in addition to handling of a large amount of data, the protocol is also complicated and the analysis processing scale is large, thus the server and the client terminal need to comprise complicated functions concerning moving pictures. Then, the service provider and the end user have machines each having a sufficient processing scale and performance on their own responsibility as computers for providing the server and the client terminal.

By the way, in the communication network as described so far, it is sufficiently considered that the contract situation of the communication service is changed frequently as the end user quits or restarts the contract of the enjoyed communication service or changes the contents of the contract in addition to change in the service contents provided by the service provider.

Thus, if monitor software of a large analysis processing scale is installed in the client terminal of the end user all the time, the possibility that the monitor software will come to naught because of contract change, etc., becomes high.

A form wherein the data analysis function may be used



intermittently with no necessity for continuous monitoring is also possible. In such a case, if monitor software of a large analysis processing scale is made resident in the client terminal, the storage area occupied by the monitor software is consumed in vain although the use frequency of the monitor software is small; the monitor software becomes a needless burden for the end user.

Further, the conventional monitor software installation work is intricate and it is not easy for general people having no knowledge of software to perform such installation work. The necessity for performing burdensome installation work each time the monitor software is used becomes a large burden for the end user.

It is therefore an object of the invention to provide a communication monitor system where if the service contents provided by a service provider or the contract situation with the end user is changed, a server placed in the service provider can easily install or uninstall monitor software for a client terminal of the end user making a contract with the service provider without troubling the end user.

To achieve the above object, according to a first aspect of the invention, there is provided a communication monitor system wherein monitor software in a client terminal gathers communication data and analyzes the data, then transmits the

resultant data to a server via a network and the server monitors communication on the network based on the data, characterized in that the server comprises storage means for storing the type of monitor software installed in the client terminal, determination means for detecting change in a contract condition with the client terminal, determining an appropriate monitor software type for the client terminal in response to the change, and updating the storage contents of the storage means to the appropriate monitor software type, and instruction means for instructing the client terminal to change the type of monitor software in the client terminal to the appropriate monitor software type, and that the client terminal comprises installation means for updating the installed monitor software in response to the instruction from the server.

In a second aspect of the invention, in the communication monitor system according to the first aspect of the invention, the instruction means detects one of the appropriate monitor software types, not contained in the installed monitor software types and prepares monitor software corresponding to the detected monitor software type, then transmits the prepared monitor software to the client terminal, and the installation means installs the monitor software transmitted from the instruction means.

In a third aspect of the invention, in the communication monitor system according to the first or second aspect of the

invention, the instruction means detects one of the installed monitor software types, not contained in the appropriate monitor software types and instructs the client terminal to erase monitor software corresponding to the detected monitor software type, and the installation means uninstalls the monitor software instructed to be erased by the instruction means.

In a fourth aspect of the invention, in the communication monitor system according to the first to third aspects of the invention, the installation means is a move agent.

In the accompanying drawings:

FIG. 1 is a block diagram to show the configuration of a communication system having a communication monitor system according to one embodiment of the invention;

FIG. 2 is a schematic representation to show various pieces of data contained in contract data in the embodiment of the invention;

FIG. 3 is a block diagram to show the functions of an installation autonomous determination section in the embodiment of the invention;

FIG. 4 is a block diagram to show the functions of a monitor software code section in the embodiment of the invention; and

FIG. 5 is a block diagram to show the functions of a monitor software installation section 15 in the embodiment of the

invention.

Referring now to the accompanying drawings, there is shown a preferred embodiment of the invention. In the embodiment, if the end user having a client terminal in which an agent system is installed newly contracts to receive a service involving use of a protocol of a large processing scale with a communication service provider or quits or restarts the contract or changes the contents thereof, a server placed in the communication service provider installs or uninstalls monitor software comprising a data gathering function and an analysis function in the client terminal without the need for the end user to perform intricate work.

Then, first the above-described agent system will be discussed. The agent system is a running environment for specific software and is middleware positioned between an operating system (OS) and an application program. Some agent systems include a technology called "move agent" wherein software moves to another computer through a network and is executed. In a form wherein a number of computers each installing software called an agent system or an agent platform are connected to a network, a move agent having a specific function is moved from one computer to another in turn and software carried on the move agent is executed on the computer to which the move agent is moved.

A large number of studies, prototypes, and experiments such as Aglets of IBM (International Business Machines) corporation (refer to <http://www.trl.ibm.co.jp/aglets/about-j.html> as Uniform Resource Locattor (URL)) exist as such agent systems. Trip ticket reservation application "TabiCan" is proposed by the IBM corporation as an application example of the agent system. Hitherto, to reserve a travel or a plane ticket, it has been necessary for the customer to move around from one travel agent to another, call a number of travel agents, or access Internet search servers of a number of travel agents; such a procedure becomes a hard burden for the customer. In contrast, to use the agent system, it is also made possible for the move agent to search for information, etc., required for reservation while moving from one database to another on the communication network relevant to travels and send the search result to the client terminal of the requesting customer by electronic mail.

Most of the move agent technology is at the study or research stage and effective application examples using the move agent technology are still few. An example of using the move agent technology for installing monitor software having a data gathering function and an analysis function in a client terminal for the purpose of monitoring a communication network does not appear yet. However, the move agent technology has the advantage that it takes the load off the communication network and the end user, and taking the load off is at stake in the future information

network society; therefore, a prediction that the agent system will be mounted on a computer as standard equipment is made. Under such circumstances, a computer in which an agent system is already installed would be easily made available to the end user who attempts to enjoy a new service involving use of a protocol of a large processing scale.

FIG. 1 is a block diagram to show the configuration of a communication system having a communication monitor system according to the embodiment of the invention. In the figure, a server 10 is a computer placed in a communication service provider, a client terminal 20 is a computer operated by the end user, and the server 10 and the client terminal 20 are connected to a communication network 30. In fact, a large number of client terminals are connected to the communication network 30, but for simplicity, only one client terminal in behave of the client terminals is shown in FIG. 1.

The server 10 is made up of a communication service section 11, an end user information section 12, an installation autonomous determination section 13, a monitor software code section 14, a monitor software installation section 15, memory for storing contract data 16, a communication monitor analysis section 17, and a network I/F (interface) 18. The communication service section 11 is a functional block for realizing various services provided by a general communication service provider and therefore will not be discussed here in detail.

The end user information section 12 registers, changes, and deletes the contract data 16 between the provider and the end user and sends the end user name of the end user whose contract data is registered, changed, or deleted to the installation autonomous determination section 13. The contract data 16 is provided for each end user. As shown in FIG. 2, it consists of data pieces of an end user name 160, contract contents 161 with the end user, a computer address 162 and a computer type 163 of the client terminal 20 that the end user has, an installed monitor software type 164, and presence or absence of installed monitor software 165.

The contract contents 161 are a moving picture communication service, a voice telephone service, an electronic mail service, etc., and any number of services are selected from among the services provided by the communication service provider.

The computer address 162 is an address for sending monitor software 21 described later to the client terminal 20 and is represented by an IP (Internet Protocol) address, a URL, a host name, etc. The computer type 163 is information for checking the running environment of the monitor software 21, including the name and version number of the agent system installed in the client terminal 20, the type of CPU (central processing unit) forming a part of the client terminal 20, memory size, the name and version number of the OS running on the client terminal 20, and the like.

The installed monitor software type 164 contains data of the

version number of the monitor software and the like in addition to the monitor software type. The presence or absence of installed monitor software 165 indicates whether or not the installed monitor software exists in the corresponding client terminal; in the embodiment, it takes a value of "presence" or "absence".

Next, the functions of the installation autonomous determination section 13 will be discussed with reference to FIG. 3. The installation autonomous determination section 13 has a contract-monitor software correspondence table 130 for previously storing data of the type, name, version number, etc., of the appropriate monitor software, which will be hereinafter referred to collectively as the appropriate monitor software type, as a list for each contract content. The reason why it is provided is that since the moving picture communication service and the electronic mail service, for example, differ largely in processing scale and protocol, the monitor software cannot be made common and dedicated monitor software becomes necessary for monitoring each service. When the content such as the contract content mentioned here changes, if the appropriate monitor software type changes accordingly, the content will be referred to as "contract condition" for convenience.

The installation autonomous determination section 13 recognizes that the contract data 16 has been registered, changed, or deleted according to a notification of the end user name from



the end user information section 12 and acquires the contract contents 161 and the installed monitor software type 164 corresponding to the received end user name (end user name with contract changed 131 shown in FIG. 3) from the contract data 16, then gets post-changed contract contents 132 and installed monitor software type 133 shown in FIG. 3.

In addition, the installation autonomous determination section 13 acquires appropriate monitor software type 134 corresponding to the post-changed contract contents 132 from the contract-monitor software correspondence table 130 and compares the installed monitor software type 133 with the appropriate monitor software type 134 for each service contained in the contract contents, whereby the installation autonomous determination section 13 detects a situation in which unfitted monitor software is installed in the client terminal 20. Such a situation includes the case where the monitor software relevant to a specific service is not installed in the client terminal 20 and needs to be newly installed or the case where the service contents provided by the communication service provider are changed and the monitor software for the service is revised and the monitor software installed in the client terminal 20 needs to be updated to the latest version.

To detect such a situation, if the appropriate monitor software type 134 does not exist in the installed monitor software type 133, the installation autonomous determination section 13

outputs a message to the effect that monitor software needs to be installed. At the time, the installation autonomous determination section 13 also outputs the type of monitor software which does not exist, namely, is to be installed. If the presence or absence of installed monitor software 165 indicates "absence," the installation autonomous determination section 13 assumes that the appropriate monitor software type 134 does not exist in the installed monitor software type 133 at all.

In addition, the installation autonomous determination section 13 checks whether or not the monitor software type not matching the appropriate monitor software type 134 exists in the installed monitor software type 133. In doing so, the installation autonomous determination section 13 determines whether or not the monitor software installed for a specific service already exists in the client terminal 20 (in other words, monitor software of a version other than the latest version exists in the client terminal 20). If the monitor software exists, the installation autonomous determination section 13 outputs a message to the effect that it is necessary to uninstall the monitor software and also outputs the type of monitor software which already exists, namely, is to be uninstalled. If the presence or absence of installed monitor software 165 indicates "absence," the installation autonomous determination section 13 does not execute the above-described check and does not output the message to the effect that it is necessary to uninstall the monitor

software either.

On the other hand, if the installed monitor software type 133 and the appropriate monitor software type 134 match completely, it means that the appropriate monitor software is installed in the client terminal 20. Therefore, in this case, the installation autonomous determination section 13 outputs a message to the effect that it is not necessary to add or change any monitor software to or in the client terminal 20 (fitted or unfitted installation and uninstallation determination 135 shown in FIG. 3).

Next, the functions of the monitor software code section 14 will be discussed with reference to FIG. 4. If the monitor software code section 14 receives a message to the effect that monitor software needs to be installed from the installation autonomous determination section 13, it performs the following processing: The monitor software code section 14 acquires the end user name with contract changed 131 from the installation autonomous determination section 13, acquires the computer type 163 corresponding to the end user name with contract changed 131 from the contract data 16, and gets computer type 140 shown in FIG. 4.

The monitor software code section 14 acquires the appropriate monitor software type 134 generated by the installation autonomous determination section 13. It generates appropriate monitor software code 141 concerning the type of

monitor software to be installed based on the appropriate monitor software type 134 and the computer type 140. In this case, all types of monitor software codes that can exist in the monitor software code section 14 may be previously stored and the appropriate monitor software code 141 may be found from among the stored monitor software codes according to the appropriate monitor software type 134 and the computer type 140.

Next, the functions of the monitor software installation section 15 will be discussed with reference to FIG. 5. The monitor software installation section 15 acquires the end user name with contract changed 131 from the installation autonomous determination section 13, takes out the computer address 162 corresponding to the end user name 131 from the contract data 16, and gets the computer address 150. If the monitor software installation section 15 receives a message to the effect that uninstallation is required from the installation autonomous determination section 13, it transmits an uninstallation message 151 to the client terminal 20 having the computer address 150 via the network I/F 18 and the network 30. At the time, the monitor software installation section 15 receives the type of monitor software to be uninstalled from the installation autonomous determination section 13 and places the monitor software type in the message (uninstallation determination section 152 shown in FIG. 5). If the monitor software installation section 15 receives a message to the effect that installation is required from the

installation autonomous determination section 13, it acquires the appropriate monitor software code 141 from the monitor software code section 14 and transmits the code to the client terminal 20 having the computer address 150 (installation no 153 shown in FIG. 5).

On the other hand, in FIG. 1, the client terminal 20 receives the appropriate monitor software code 141 via the network 30 from the monitor software installation section 15 and installs the code internally as the monitor software 21. The client terminal 20 has the above-described agent system, for example, as the installation means. In addition, the client terminal 20 receives an uninstallation message 151 via the network 30 from the monitor software installation section 15 and erases the monitor software corresponding to the monitor software type specified in the message. The client terminal 20 has the above-described agent system, for example, as the erasion means.

The functions of the monitor software 21 will be discussed.

The monitor software 21 has a data gathering function of capturing data received from the network 30 (capture 210 shown in FIG. 1) and also carries out an analysis based on the captured data (analysis 211 shown in FIG. 1). The analysis function includes a calculation function of data amount and traffic, an identification function of transmission/reception address and host name, an identification function of the type of protocol such as FTP (File Transfer Protocol), HTTP (HyperText Transfer

Protocol), or SNMP, an extraction function of MPEG (Moving Picture Experts Group) code, and the like. The monitor software 21 also has a function of asynchronously transmitting the captured data or the analysis result produced by the analysis function via the network 30 to the server 10 (transmission 212 and asynchronous messaging 213 shown in FIG. 1).

The functions of the communication monitor analysis section 17 will be discussed. The communication monitor analysis section 17 receives the captured data and the analysis result transmitted from the monitor software 21 and analyzes the traffic and availability involved in the communication service and the traffic and availability by protocol and by terminal or analyzes data based on a specific protocol and uses the data as quality data for optimizing the quality of the communication service. For example, to optimize the quality of the moving picture communication service, the communication monitor analysis section 17 has a function of evaluating the moving picture quality difference based on the moving picture coding mode difference for supporting selection of the optimum moving picture coding mode.

This point is disclosed in Japanese Patent Application Nos. Hei 9-216814 and Hei 10-52531 filed by the present applicant.

On the other hand, the network I/F 18 and a network I/F 22 shown in FIG. 1 are interface circuits for controlling communication between the server 10 and the network 30 and communication between the client terminal 20 and the network 30

respectively.

Next, the installation operation and uninstallation operation of the monitor software performed in the described communication monitor system will be discussed. The description to follow assumes that the contract data relevant to the end user operating the client terminal 20 is not yet registered in the contract data 16 and will be newly registered therein.

(Example 1)

First, as a case where monitor software is installed, assume that the end user makes a new contract with a communication service provider. The communication service provider feeds the contract contents (namely, the end user name 160, the contract contents 161, the computer address 162, and the computer type 163) into the server 10 in accordance with the proposal of the end user, the end user information section 12 registers the contract contents in the contract data 16 as the contract data relevant to the end user. At this time, the end user information section 12 initializes the installed monitor software type 164 to a predetermined value not matching any monitor software type and also initializes the presence or absence of installed monitor software 165 to "absence." Next, the end user information section 12 sends the end user name 160 to the installation autonomous determination section 13. To make a proposal of the contract contents, the end user may operate the client terminal 20 for sending the contract data via the network 30 to the server 10.

In this case, the communication service provider inspects the sent contract contents, then registers the contract data 16 in the server 10 as described above.

On the other hand, the installation autonomous determination section 13 recognizes that the contract data 16 has been registered with the fact that the end user name with contract changed 131 is sent as the end user name as a trigger, and acquires the contract contents 161 and the installed monitor software type 164 corresponding to the end user name from the contract data 16, then sets them as the post-changed contract contents 132 and the installed monitor software type 133. At the time, the installation autonomous determination section 13 outputs the end user name with contract changed 131 to the monitor software code section 14 and the monitor software installation section 15. Next, the installation autonomous determination section 13 acquires the appropriate monitor software type 134 corresponding to the post-changed contract contents 132 from the contract-monitor software correspondence table 130 and outputs the appropriate monitor software type 134 to the monitor software code section 14.

Next, the installation autonomous determination section 13 checks to see if the appropriate monitor software type 134 is contained in the installed monitor software type 133. In this case, since monitor software 21 is not installed in the client terminal 20 at all and the presence or absence of installed monitor



software 165 contained in the contract data 16 indicates "absence," the installation autonomous determination section 13 outputs a message indicating the necessity for installing monitor software to the monitor software code section 14 and the monitor software installation section 15. Since the presence or absence of installed monitor software 165 indicates "absence," the installation autonomous determination section 13 does not output a message to the effect that monitor software needs to be uninstalled. After this, the installation autonomous determination section 13 replaces the contents of the installed monitor software type 164 in the contract data 16 with the appropriate monitor software type 134 and updates the presence or absence of installed monitor software 165 to "presence".

On the other hand, upon reception of the message to the effect that monitor software needs to be installed from the installation autonomous determination section 13, the monitor software code section 14 takes out the computer type 163 corresponding to the end user name with contract changed 131 from the contract data 16 and sets the computer type 163 as the computer type 140. Next, the monitor software code section 14 generates the appropriate monitor software code 141 for the type of monitor software to be installed based on the computer type 140 and the appropriate monitor software type 134 sent from the installation autonomous determination section 13, then outputs the appropriate monitor software code 141 to the monitor software installation

section 15.

On the other hand, upon reception of the message to the effect that monitor software needs to be installed from the installation autonomous determination section 13, the monitor software installation section 15 acquires the computer address 162 corresponding to the end user name with contract changed 131 from the contract data 16 and gets the computer address 150. When the appropriate monitor software code 141 is sent from the monitor software code section 14, the monitor software installation section 15 instructs the network I/F 18 to transmit the appropriate monitor software code 141 via the network 30 to the client terminal 20 corresponding to the computer address 150, whereby the client terminal 20 uses the agent system to receive the appropriate monitor software code 141 sent from the monitor software installation section 15 and installs the appropriate monitor software code 141 as the monitor software 21.

After this, whenever a new service is added as the contract content, the server 10 generates the appropriate monitor software code 141 corresponding to the new added service and transmits the appropriate monitor software code 141 to the client terminal 20 and the client terminal 20 receives and installs the appropriate monitor software code 141 according to a similar procedure to that described above.

(Example 2)

Next, as a case where monitor software is neither

installed nor uninstalled although the contract data is changed, the case where the computer address of the client terminal 20 is changed after [Example 1] will be discussed. In this case, the client terminal 20 sends a message indicating change in the computer address together with the end user name of the client terminal 20 and a new computer address to the server 10 via the network 30. The end user information section 12 analyzes the sent message and updates the computer address 162 corresponding to the end user contained in the contract data 16 to the new computer address, then sends the end user name with the contract changed to the installation autonomous determination section 13.

Upon reception of the information, the installation autonomous determination section 13 recognizes that the contract data 16 has been changed, and acquires the end user name with contract changed 131, the post-changed contract contents 132, and the installed monitor software type 133. Next, the installation autonomous determination section 13 acquires the appropriate monitor software type 134 corresponding to the post-changed contract contents 132 from the contract-monitor software correspondence table 130 and compares the appropriate monitor software type 134 with the installed monitor software type 133.

In this case, the contract contents 161 contained in the contract data 16 are not changed and thus the installed monitor software type 133 and the appropriate monitor software type 134 match completely. Therefore, the installation autonomous

determination section 13 does not output a message indicating the necessity for installing monitor software not as in [Example 1] and does not output a message to the effect that monitor software needs to be uninstalled either as in [Example 1]. Thus, the monitor software code section 14 and the monitor software installation section 15 do not perform any operation and the result is that the contract data 16 is only changed.

(Example 3)

Next, as a case where monitor software is uninstalled, the case where the end user cancels a part of the contract contents after [Example 2] will be discussed. For example, the end user, who already contracts to receive the moving picture communication service, the voice telephone service, and the electronic mail service by repeating the procedure previously described in [Example 1], may cancel the contract of the electronic mail service. In this case, the end user operates the client terminal 20 to send a message indicating the service to be canceled and containing the data for the canceling together with the end user name of the end user to the server 10. In the server 10, the end user information section 12 analyzes the sent message and deletes the electronic mail service from the contract contents 161 contained in the contract data 16, then sends the end user name to the installation autonomous determination section 13.

Thus, the installation autonomous determination section 13 recognizes that the contract data 16 has been changed, and

acquires the end user name with contract changed 131, the post-changed contract contents 132, and the installed monitor software type 133, then outputs the end user name with contract changed 131 to the monitor software code section 14 and the monitor software installation section 15. Next, the installation autonomous determination section 13 acquires the appropriate monitor software type 134 corresponding to the post-changed contract contents 132 from the contract-monitor software correspondence table 130 and outputs the appropriate monitor software type 134 to the monitor software code section 14. It is also possible that the post-changed contract contents 132 do not contain any service. Then, in such a case, the installation autonomous determination section 13 generates the above-described predetermined value not matching any monitor software type.

Next, the installation autonomous determination section 13 checks whether or not the appropriate monitor software type 134 is contained in the installed monitor software type 133. In this case, the contract contents concerning the services other than the electronic mail service canceled are not changed, thus the appropriate monitor software type 134 is all contained in the installed monitor software type 133. Therefore, the installation autonomous determination section 13 does not output a message indicating the necessity for installing monitor software. Thus, the monitor software code section 14 does not

perform any operation.

On the other hand, as a result of changing the contract contents 161, the installed monitor software type 133 and the appropriate monitor software type 134 do not completely match, and the monitor software not contained in the appropriate monitor software type 134 (namely, the monitor software for the electronic mail service) exists in the installed monitor software type 133.

Thus, the installation autonomous determination section 13 outputs a message to the effect that the monitor software needs to be uninstalled together with the type of monitor software to be uninstalled (namely, the electronic mail service monitor software) to the monitor software installation section 15.

After this, the installation autonomous determination section 13 replaces the contents of the installed monitor software type 164 in the contract data 16 with the appropriate monitor software type 134. It is also possible that the last service in the contract may be canceled, in which case the appropriate monitor software type 134 does not contain any monitor software type. In such a case, the installation autonomous determination section 13 sets the installed monitor software type 164 to the above-described predetermined value not matching any monitor software type and updates the presence or absence of installed monitor software 165 to "absence".

On the other hand, upon reception of the message to the effect that the monitor software needs to be uninstalled from the

installation autonomous determination section 13, the monitor software installation section 15 acquires the computer address 150 from the contract data 16, then instructs the network I/F 18 to place the type of monitor software corresponding to the electronic main service in the uninstallation message 151 and then transmit the uninstallation message 151 via the network 30 to the client terminal 20 having the computer address 150 (see the uninstallation determination section 152 shown in FIG. 5), whereby the client terminal 20 uses the agent system to erase the monitor software for the electronic mail service specified in the uninstallation message 151.

(Example 4)

Next, as a case where both installation and uninstallation are executed, the case where the communication service provider changes the service contents concerning a specific service after (Example 3) will be discussed. In this case, as the service contents are changed, the monitor software for the corresponding service is revised and the version number of the monitor software is changed. Then, for the service whose service contents are changed, the server 10 updates the appropriate monitor software type 134 contained in the contract-monitor software correspondence table 130 to the monitor software type matching new service contents. It also updates the functions of the monitor software code section 14 so that the monitor software code section 14 generates the appropriate

monitor software code 141 corresponding to the new service contents. Next, the server 10 performs the following processing in sequence for all end user names 160 contained in the contract data 16.

The end user information section 12 detects the service contents being changed, then selects one end user name from among all end user names and sends the selected end user name to the installation autonomous determination section 13, which then acquires the end user name with contract changed 131, the post-changed contract contents 132, and the installed monitor software type 133, and outputs the end user name with contract changed 131 to the monitor software code section 14 and the monitor software installation section 15 as the contents of the contract data 16 are changed. This means that if the service contents are changed, the event is handled in the same manner as the contract data 16 is changed with respect to each end user. Next, the installation autonomous determination section 13 acquires the appropriate monitor software type 134 corresponding to the post-changed contract contents 132 from the contract-monitor software correspondence table 130 and outputs the appropriate monitor software type 134 to the monitor software code section 14. This appropriate monitor software type 134 output is that corresponding to the change in the service contents.

Next, the installation autonomous determination section 13 checks to see if the appropriate monitor software type 134 is



contained in the installed monitor software type 133. In this case, since the monitor software revised corresponding to the change in the service contents is not yet installed in the client terminal 20, the appropriate monitor software type 134 relevant to the service whose service contents are changed does not exist in the installed monitor software type 133. Thus, the installation autonomous determination section 13 outputs a message indicating the necessity for installing monitor software to the monitor software code section 14 and the monitor software installation section 15.

In addition, of the installed monitor software type 133, the pre-revised monitor software not corresponding to the change in the service contents does not exist in the appropriate monitor software type 134. Thus, the installation autonomous determination section 13 outputs a message to the effect that monitor software needs to be uninstalled together with the type of monitor software to be uninstalled (namely, the type of monitor software for the service whose service contents are changed) to the monitor software installation section 15. After this, the installation autonomous determination section 13 replaces the contents of the installed monitor software type 164 with the appropriate monitor software type 134.

On the other hand, upon reception of the message to the effect that monitor software needs to be uninstalled, the monitor software installation section 15 places the type of monitor

software corresponding to the service whose service contents are changed in the uninstallation message 151, then transmits the uninstallation message 151 to the client terminal 20 having the computer address 150 as in [Example 3], whereby the client terminal 20 erases the monitor software 21 corresponding to the monitor software type specified in the uninstallation message 151.

Thus, the pre-revised monitor software is first uninstalled from the client terminal 20.

On the other hand, upon reception of the message to the effect that monitor software needs to be installed, the monitor software code section 14 generates the appropriate monitor software code 141 for the type of monitor software corresponding to the service whose service contents are changed, then outputs the appropriate monitor software code 141 to the monitor software installation section 15 as in [Example 1]. When the monitor software installation section 15 receives the message to the effect that monitor software needs to be installed, it transmits the appropriate monitor software code 141 to the client terminal 20 having the computer address 150 when the appropriate monitor software code 141 is sent from the monitor software code section 14 as in (Example 1), whereby the client terminal 20 installs the sent appropriate monitor software code 141. Thus, the revised monitor software is installed in the client terminal 20.

In the embodiment, with the contract contents 161 as "contract condition," the appropriate monitor software type 134

is provided for each "contract condition" (contract Contents 161).

However, it is also possible that the monitor software type may be changed as the computer type 163 is changed. Thus, the computer type 163 may be added to the "contract condition" and the contract-monitor software correspondence table 130 may be formed so as to provide the appropriate monitor software type 134 for each computer type 163.

As described above, in the invention, the server stores the type of monitor software installed in the client terminal.

If the contract condition is changed, the server determines an appropriate monitor software type in response to the change and updates the storage contents of the storage means, then instructs the client terminal to change the type of monitor software in the client terminal to the appropriate monitor software type. Then, the client terminal installs or uninstalls the monitor software in accordance with the instruction for updating the installed monitor software.

Thus, if the contract condition is changed frequently as the end user possessing the client terminal quits or restarts the contract of the communication service or changes the contents of the contract, the contract software installed in the client terminal matches the contract condition under the control of the server, solving the problem wherein the monitor software consumes the storage area in vain although the use frequency of the monitor software is small. the storage area occupied by the monitor

software is consumed in vain although the use frequency of the monitor software is small. Since the need is also eliminated for the end user to execute the intricate procedure of installing the monitor software in the client terminal, a needless burden for the end user is eliminated.

In the invention, the installation means is a move agent, so that the load on the network and the client terminal can be lightened.

## CLAIMS

1. A communication monitor system wherein monitor software in a client terminal gathers communication data and analyzes the data, then transmits the resultant data to a server via a network and the server monitors communication on the network based on the data, said server comprising:

storage means for storing the type of monitor software installed in the client terminal;

determination means for detecting change in a contract condition with the client terminal, determining an appropriate monitor software type for the client terminal in response to the change, and updating the storage contents of the storage means to the appropriate monitor software type; and

instruction means for instructing the client terminal to change the type of monitor software in the client terminal to the appropriate monitor software type;

said client terminal comprising:

installation means for updating the installed monitor software in response to the instruction from the server.

2. The communication monitor system as claimed in claim 1 wherein the instruction means detects one of the appropriate monitor software types, not contained in the installed monitor software types and prepares monitor software corresponding to the detected monitor software type, then transmits the prepared monitor software to the client terminal;

and

wherein the installation means installs the monitor software transmitted from the instruction means.

3. The communication monitor system as claimed in claim 1 wherein the instruction means detects one of the installed monitor software types, not contained in the appropriate monitor software types and instructs the client terminal to erase monitor software corresponding to the detected monitor software type; and

wherein the installation means uninstalls the monitor software instructed to be erased by the instruction means.

4. The communication monitor system as claimed in claim 1 wherein the installation means is a move agent.



Application No: GB 9920062.8  
Claims searched: All

Examiner: Gareth Griffiths  
Date of search: 11 January 2000

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK CI (Ed.R): H4L (LDTU, LDTR, LDTX, LFMX), H4P (PEUL, PEUX, PPD)  
Int CI (Ed.7): G06F 9/445, H04L 12/24, 12/26, H04Q 7/32, 7/34  
Other: Online Databases: WPI, EPODOC, JAPIO

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A	GB2335124 A (3COM)	
A	US5742829 (DAVIS)	

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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